California
Manual on Uniform
Traffic Control Devices
for Streets and Highways
**(FHWA's MUTCD 2003 Edition
including Revisions 1 and 2,
as amended for use in California)**

PART 5
Traffic Control Devices
for Low-Volume Roads

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION

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PART 5. TRAFFIC CONTROL DEVICES FOR LOW-VOLUME ROADS

TABLE OF CONTENTS

CHAPTER 5A. GENERAL

Section 5A.01 Function

Support:

At some locations on low-volume roads, the use of traffic control devices might be needed to provide the road user limited, but essential, information regarding regulation, guidance, and warning.

Other Parts of this Manual contain criteria applicable to all low-volume roads; however, Part 5 specifically supplements and references the criteria for traffic control devices commonly used on low-volume roads.

Standard:

A low-volume road shall be defined for this Part of the Manual as follows:

A. A low-volume road shall be a facility lying outside of built-up areas of Cities, towns, and communities, and it shall have a traffic volume of less than 400 AADT.

B. A low-volume road shall not be a freeway, expressway, interchange ramp, freeway service road, or a road on a designated State highway system. In terms of highway classification, it shall be a variation of a conventional road or a special purpose road as defined in Section 2A.01.

C. A low-volume road shall be classified as either paved or unpaved.

Support:

Low-volume roads typically include farm-to-market, recreational, resource management and development, and local roads.

Guidance:

The needs of unfamiliar road users for occasional, recreational, and commercial transportation purposes should be considered.

Section 5A.02 Application

Support:

It is possible, in many cases, to provide essential information to road users on low-volume roads with a limited number of traffic control devices. The focus might be on devices that:

A. Warn of conditions not normally encountered;

B. Prohibit unsafe movements; or

C. Provide minimal destination guidance.

As with other roads, the application of traffic control devices on low-volume roads is based on engineering judgment or studies.

Standard:

The criteria contained in Part 5 shall not prohibit the installation nor the full application of traffic control devices on a low-volume road where conditions justify their use.

Guidance:

Additional traffic control devices and criteria contained in other Parts of the Manual should be considered for use on low-volume roads.

Section 5A.03 Design

Standard:

Traffic control devices for use on low-volume roads shall be designed in accordance with the criteria contained in Part 5, and where required, in other applicable Parts of this Manual.

The typical sizes for signs installed on low-volume roads shall be as shown in Table 5A-1. The Minimum sign sizes shall only be used on low-volume roads where the 85th-percentile speed or posted speed limit is less than 60 km/h (35 mph).

All signs shall be retroreflective or illuminated to show the same shape and similar color both day and night, unless specifically stated otherwise in other applicable Parts of this Manual. The requirements for sign illumination shall not be considered to be satisfied by street, highway, or strobe lighting.

All markings shall be visible at night and shall be retroreflective unless ambient illumination provides adequate visibility of the markings.

Guidance:

Oversized sign sizes should be used where engineering judgment indicates a need based on high vehicle operating speeds, driver expectancy, traffic operations, or roadway conditions.

Section 5A.04 Placement

Standard:

The traffic control devices used on low-volume roads shall be placed and positioned in accordance with the criteria contained in Part 5 and, where necessary, in accordance with the lateral, longitudinal, and vertical placement criteria contained in Part 2 and other applicable Sections of this Manual.

Guidance:

The placement of warning signs should conform to the guidance contained in Section 2C.05 and other applicable Sections of this Manual.

Option:

A lateral offset of not less than 0.6 m (2 ft) from the roadway edge to the roadside edge of a sign may be used where roadside features such as terrain, shrubbery, and/or trees prevent lateral placement in accordance with Section 2A.19.

Standard:

If located within a clear zone, ground-mounted sign supports shall be yielding, breakaway, or shielded with a longitudinal barrier or crash cushion as required in Section 2A.19.

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Table 5A-1. Minimum Sign Sizes on Low-Volume Roads (Sheet 1 of 2)

Sign	MUTCD Code	Section	Sign Sizes		
			Typical	Minimum	Oversized
Stop	R1-1	5B.02	750 x 750 (30 x 30)	—	900 x 900 (36 x 36)
Yield	R1-2	5B.02	750 x 750 x 750 (30 x 30 x 30)	—	900 x 900 x 900 (36 x 36 x 36)
Speed Limit (English)	R2-1	5B.03	600 x 750 (24 x 30)	450 x 600 (18 x 24)	900 x 1200 (36 x 48)
~~Speed Limit (Metric)~~	~~R2-1~~	~~5B.03~~	~~600 x 900 (24 x 36)~~	~~450 x 750 (18 x 30)~~	~~900 x 1350 (36 x 54)~~
Do Not Pass	R4-1	5B.04	600 x 750 (24 x 30)	450 x 600 (18 x 24)	900 x 1200 (36 x 48)
Pass With Care	R4-2	5B.04	600 x 750 (24 x 30)	450 x 600 (18 x 24)	900 x 1200 (36 x 48)
Keep Right	R4-7	5B.04	600 x 750 (24 x 30)	450 x 600 (18 x 24)	900 x 1200 (36 x 48)
Do Not Enter	R5-1	5B.04	750 x 750 (30 x 30)	—	900 x 900 (36 x 36)
No Trucks	R5-2	5B.04	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
One Way	R6-2	5B.04	450 x 600 (18 x 24)	—	600 x 750 (24 x 30)
No Parking	R8-3	5B.05	450 x 600 (18 x 24)	—	600 x 750 (24 x 30)
No Parking (symbol)	R8-3a	5B.05	600 x 600 (24 x 24)	450 x 450 (18 x 18)	750 x 750 (30 x 30)
No Parking (plaque)	R8-3c,3d	5B.05	600 x 450 (24 x 18)	450 x 300 (18 x 12)	750 x 600 (30 x 24)
Road Closed	R11-2	5B.04	1200 x 750 (48 x 30)	—	—
Road Closed, Local Traffic Only	R11-3a	5B.04	1500 x 750 (60 x 30)	—	—
Bridge Out, Local Traffic Only	R11-3b	5B.04	1500 x 750 (60 x 30)	—	—
Weight Limit	R12-1	5B.04	600 x 750 (24 x 30)	—	900 x 1200 (36 x 48)
Railroad Crossbuck	R15-1	5F.02	1200 x 225 (48 x 9)	—	—
Number of Tracks	R15-2	5F.02	675 x 450 (27 x 18)	—	—
Horizontal Alignment	W1-1,2,3,4,5	5C.02	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
One-Direction Large Arrow	W1-6	5C.02	900 x 450 (36 x 18)	—	1200 x 600 (48 x 24)
Two-Direction Large Arrow	W1-7	5C.02	900 x 450 (36 x 18)	—	1200 x 600 (48 x 24)
Chevron Alignment	W1-8	5C.02	300 x 450 (12 x 18)	—	450 x 600 (18 x 24)
Intersection Warning	W2-1,4,5	5C.03	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
Stop Ahead	W3-1	5C.04	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Yield Ahead	W3-2	5C.04	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Be Prepared to Stop	W3-4	5G.05	900 x 900 (36 x 36)	750 x 750 (30 x 30)	1200 x 1200 (48 x 48)
Narrow Bridge	W5-2	5C.05	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
One Lane Bridge	W5-3	5C.06	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Hill	W7-1,1a	5C.07	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
XX % Grade	W7-3	5C.07	600 x 450 (24 x 18)	—	750 x 600 (30 x 24)

Table 5A-1. Minimum Sign Sizes on Low-Volume Roads (Sheet 2 of 2)

Sign	MUTCD Code	Section	Sign Sizes		
			Typical	Minimum	Oversized
Next XX ~~km~~ (Miles)	W7-3a	5C.09	600 x 450 (24 x 18)	—	750 x 600 (30 x 24)
Pavement Ends	W8-3	5C.08	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Loose Gravel	W8-7	5G.05	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Railroad Advance Warning	W10-1	5F.03	600 Dia. (24 Dia.)	450 Dia. (18 Dia.)	750 Dia. (30 Dia.)
Crossing Warning	W10-2,3,4	5F.03	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Entering/Crossing	W11 Series	5C.09	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
Advisory Speed (plaque)	W13-1	5C.10	450 x 450 (18 x 18)	—	600 x 600 (24 x 24)
Dead End/No Outlet	W14-1,2	5C.11	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Dead End/No Outlet	W14-1a,2a	5C.11	900 x 225 (36 x 9)	600 x 150 (24 x 6)	—
No Passing Zone (pennant)	W14-3	5G.05	(750 x 1000 x 1000) (30 x 40 x 40)	(600 x 900 x 900) (24 x 36 x 36)	(900 x 1200 x 1200) (36 x 48 x 48)
Supplemental Distance (plaque)	W16-2	5C.09	600 x 450 (24 x 18)	450 x 300 (18 x 12)	750 x 600 (30 x 24)
Ahead (plaque)	W16-9p	5C.09	600 x 300 (24 x 12)	—	750 x 450 (30 x 18)
No Traffic Signs	W18-1	5C.12	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)
Road Work XX ~~m~~ (Ft)	W20-1	5G.05	900 x 900 (36 x 36)	750 x 750 (30 x 30)	1200 x 1200 (48 x 48)
~~Flagger~~	~~W20-7a~~	~~5G.05~~	~~900 x 900 (36 x 36)~~	~~750 x 750 (30 x 30)~~	~~1200 x 1200 (48 x 48)~~
Workers	W21-1a	5G.05	900 x 900 (36 x 36)	750 x 750 (30 x 30)	1200 x 1200 (48 x 48)
Fresh Oil	W21-2	5G.05	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
Road Machinery Ahead	W21-3	5G.05	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
Shoulder Work	W21-5	5G.05	600 x 600 (24 x 24)	—	750 x 750 (30 x 30)
Survey Crew	W21-6	5G.05	750 x 750 (30 x 30)	600 x 600 (24 x 24)	900 x 900 (36 x 36)

Notes: 1. Larger signs may be used when appropriate
2. Dimensions are shown in millimeters followed by inches in parentheses and are shown as width x height

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CHAPTER 5B. REGULATORY SIGNS

Section 5B.01 Introduction

Support:

The purpose of a regulatory sign is to inform highway users of traffic laws or regulations, and to indicate the applicability of legal requirements that would not otherwise be apparent.

The criteria for regulatory signs are contained in Chapter 2B and in other Sections of this Manual. Criteria for regulatory signs that are specific to low-volume roads are contained in this Chapter.

Section 5B.02 STOP and YIELD Signs (R1-1 and R1-2)

Guidance:

STOP (R1-1) and YIELD (R1-2) signs (see Figure 5B-1) should be considered for use on low-volume roads where engineering judgment or study, consistent with the provisions of Sections 2B.04 to 2B.10, indicates that either of the following conditions applies:

A. An intersection of a less-important road with a main road where application of the normal right-of-way rule might not be readily apparent.
B. An intersection that has restricted sight distance for the prevailing vehicle speeds.

Section 5B.03 Speed Limit Signs (R2 Series)

Standard:

If used, Speed Limit (R2 series) signs (see Figure 5B-1) shall display the speed limit established by law, ordinance, regulation, or as adopted by the authorized agency following an engineering study. The speed limits shown shall be in multiples of 10 km/h or 5 mph.

Speed limits shall be established in accordance with Section 2B.13.

Option:

Speed limit signs may be used on low-volume roads that carry traffic from, onto, or adjacent to higher-volume roads that have posted speed limits.

Section 5B.04 Traffic Movement and Prohibition Signs (R3, R4, R5, R6, R9, R10, R11, R12, R13, and R14 Series)

Support:

The regulatory signs (see Figure 5B-1) in these series inform road users of required, permitted, or prohibited traffic movements involving turn, alignment, exclusion, and pedestrians.

Standard:

If used, signs for traffic prohibitions or restrictions shall be placed in advance of the prohibition or restriction so that traffic can use an alternate route or turn around.

Guidance:

Signs should be used on low-volume roads to indicate traffic prohibitions and restrictions such as road closures and weight restrictions.

Option:

These signs may be useful on a low-volume road near and at the intersections or the connections with a higher class of road, and where the regulatory message is essential for reasonably safe transition from the low-volume road to the higher-class facility and vice versa.

Section 5B.05 Parking Signs (R8 Series)

Option:

Parking signs (see Figure 5B-2) may be installed selectively on low-volume roads with due consideration of enforcement.

Section 5B.06 Other Regulatory Signs

Standard:

Other regulatory signs used on low-volume roads that are not discussed in Part 5 shall conform with the criteria contained in other Parts of this Manual.

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Figure 5B-1. Regulatory Signs on Low-Volume Roads

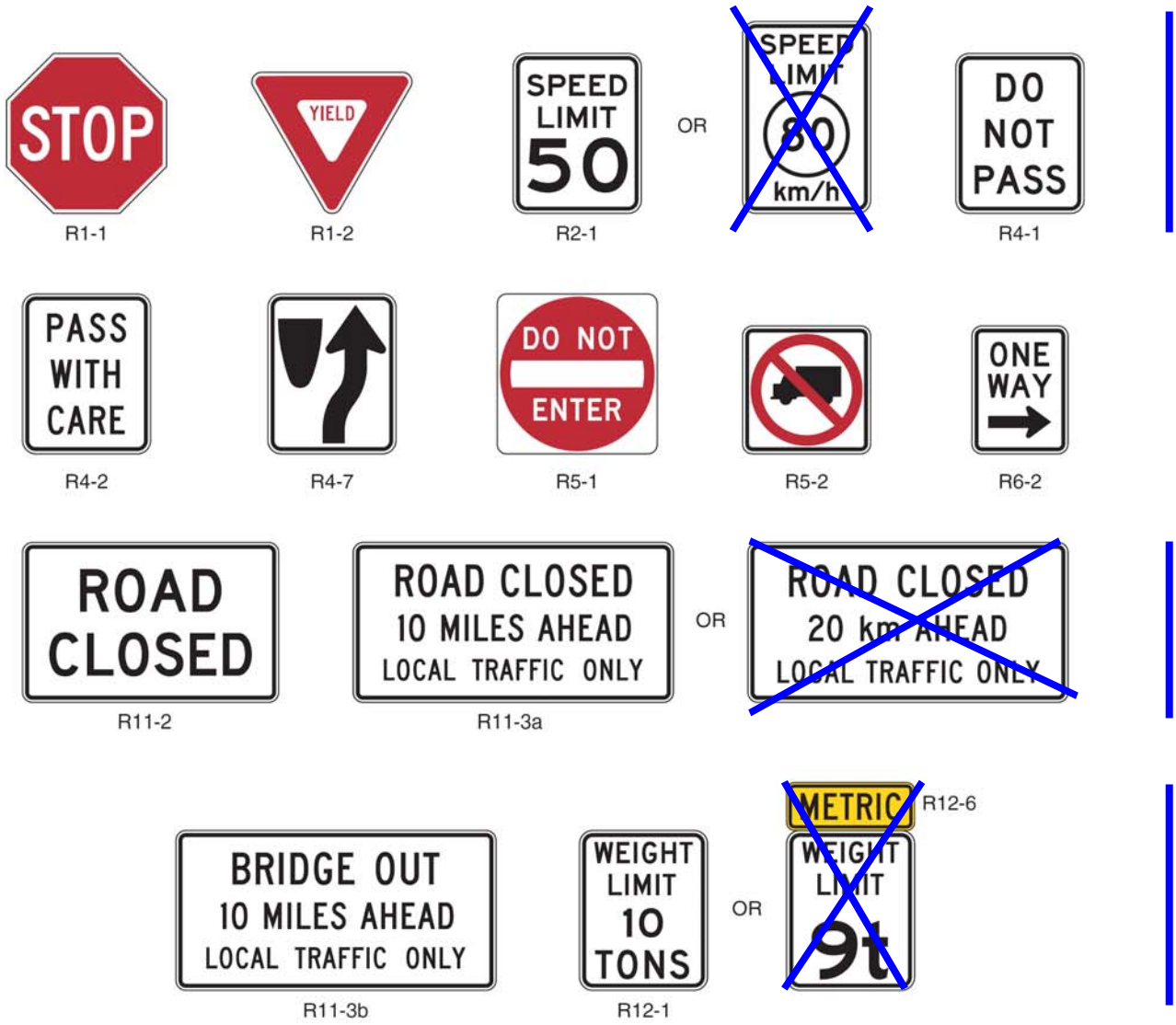

Figure 5B-2. Parking Signs on Low-Volume Roads

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CHAPTER 5C. WARNING SIGNS

Section 5C.01 Introduction

Support:

The purpose of a warning sign is to provide advance warning to the road user of unexpected conditions on or adjacent to the roadway that might not be readily apparent.

The criteria for warning signs are contained in Chapter 2C and in other Sections of this Manual. Criteria for warning signs that are specific to low-volume roads are contained in this Chapter.

Section 5C.02 Horizontal Alignment Signs (W1-1 through W1-8)

Support:

Horizontal Alignment signs (see Figure 5C-1) include turn, curve, reverse turn, reverse curve, winding road, large arrow, and chevron alignment signs.

Option:

Horizontal Alignment signs may be used where engineering judgment indicates a need to inform the road user of a change in the horizontal alignment of the roadway.

Section 5C.03 Intersection Warning Signs (W2-1 through W2-5)

Support:

Intersection signs (see Figure 5C-1) include the crossroad, side road, T-symbol, and Y-symbol signs.

Option:

Intersection signs may be used where engineering judgment indicates a need to inform the road user in advance of an intersection.

Section 5C.04 Stop Ahead and Yield Ahead Signs (W3-1, W3-2)

Standard:

A Stop Ahead (W3-1) sign (see Figure 5C-2) shall be used where a STOP sign is not visible for a sufficient distance to permit the road user to bring the vehicle to a stop at the STOP sign.

A Yield Ahead (W3-2) sign (see Figure 5C-2) shall be used where a YIELD sign is not visible for a sufficient distance to permit the road user to bring the vehicle to a stop, if necessary, at the YIELD sign.

~~Option:~~

~~Word message (W3-1a and W3-2a) signs may be used as alternates to symbol signs.~~

Section 5C.05 NARROW BRIDGE Sign (W5-2)

Option:

The NARROW BRIDGE (W5-2) sign (see Figure 5C-2) may be used on an approach to a bridge or culvert that has a clear width less than that of the approach roadway.

Section 5C.06 ONE LANE BRIDGE Sign (W5-3)

Guidance:

A ONE LANE BRIDGE (W5-3) sign (see Figure 5C-2) should be used on low-volume two-way roadways in advance of any bridge or culvert:

A. Having a clear roadway width of less than 4.9 m (16 ft); or
B. Having a clear roadway width of less than 5.5 m (18 ft) when commercial vehicles constitute a high proportion of the traffic; or
C. Having a clear roadway width of 5.5 m (18 ft) or less where the approach sight distance is limited on the approach to the structure.

Option:

Roadway alignment and additional warning may be provided on the approach to a bridge or culvert by the use of object markers and/or delineators.

Guidance:

The ONE LANE BRIDGE FOR TRUCKS AND BUSES (SR27-1(CA)) sign should be used at the approaches to a bridge that is determined to be too narrow to allow trucks or buses in opposing directions to be on the bridge at the same time.

Section 5C.07 Hill Sign (W7-1)

Option:

An engineering study of vehicles and road characteristics, such as percent grade and length of grade, may be conducted to determine hill signing requirements.

The use of the Hill (W7-1) sign (see Figure 5C-2) on low-volume roads may be confined to roads where commercial or recreational vehicles are anticipated.

Word messages (W7-1a) may be used as alternates to symbols.

Section 5C.08 PAVEMENT ENDS Sign (W8-3)

Option:

A PAVEMENT ENDS (W8-3) sign (see Figure 5C-2) may be used to warn road users where a paved surface changes to a gravel or earth road surface.

Section 5C.09 Vehicular Traffic and Nonvehicular Signs (W11 Series and W8-6)

Guidance:

Vehicular Traffic signs (see Figure 5C-2) should be used to alert road users to frequent unexpected entries into the roadway by trucks, bicyclists, farm vehicles, fire trucks, and other vehicles. Such signs should be used only at locations where the road user's sight distance is restricted or the activity would be unexpected.

Option:

Nonvehicular signs (see Figure 5C-2) may be used to alert the road user to frequent unexpected entries into the roadway by pedestrian, animal, and other crossing activities that may cause potential conflicts.

A W7-3a, W16-2, or W16-9p supplemental plaque (see Figure 5C-2), with the legend ~~NEXT XX km~~ (NEXT XX MILES), ~~XX METERS~~ (XX FEET), or AHEAD may be installed below a Vehicular Traffic or Nonvehicular sign (see Sections 2C.40 and 2C.41).

Guidance:

If the activity is seasonal or temporary, the sign should be removed or covered when the crossing activity does not exist.

Section 5C.10 Advisory Speed Plaque (W13-1)

Option:

An Advisory Speed (W13-1) plaque (see Figure 5C-1) may be mounted below a warning sign when the condition requires a reduced speed.

Section 5C.11 DEAD END or NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)

Option:

The DEAD END (W14-1) and NO OUTLET (W14-2) signs (see Figure 5C-2) and the DEAD END (W14-1a) and NO OUTLET (W14-2a) signs (see Figure 2C-3) may be used to warn road users of a road that has no outlet or that terminates in a dead end or cul-de-sac.

Guidance:

If used, these signs should be placed at a location that gives drivers of large commercial or recreational vehicles an opportunity to select a different route or turn around.

Section 5C.12 NO TRAFFIC SIGNS Sign (W18-1)

Option:

A W18-1 warning sign (see Figure 5C-2) with the legend NO TRAFFIC SIGNS may be used only on unpaved, low-volume roads to advise users that no signs are installed along the distance of the road. If used,

the sign may be installed at the point where road users would enter the low-volume road or where, based on engineering judgment, the road user may need this information.

A W7-3a, W16-2, or W16-9p supplemental plaque (see Figure 5C-2) with the legend ~~NEXT XX km~~ (NEXT XX MILES), ~~XX METERS~~ (XX FEET), or AHEAD may be installed below the W18-1 sign when appropriate.

Section 5C.13 Other Warning Signs

Standard:

Other warning signs used on low-volume roads that are not discussed in Part 5, but are in this Manual, shall conform with the criteria contained in other Parts of this Manual. Warning signs that are not specified in this Manual shall conform to the criteria in Sections 2C.02 and 2C.03.

Figure 5C-1. Horizontal Alignment and Intersection Warning Signs on Low-Volume Roads

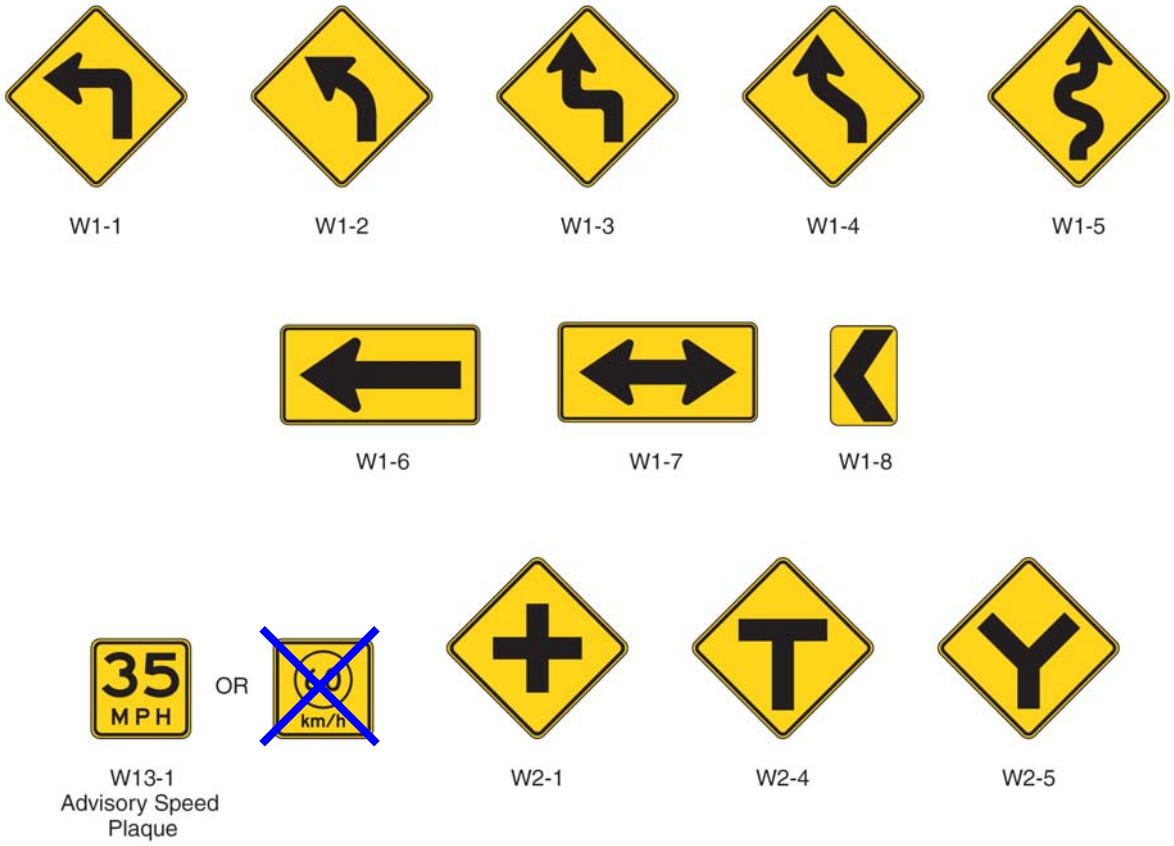

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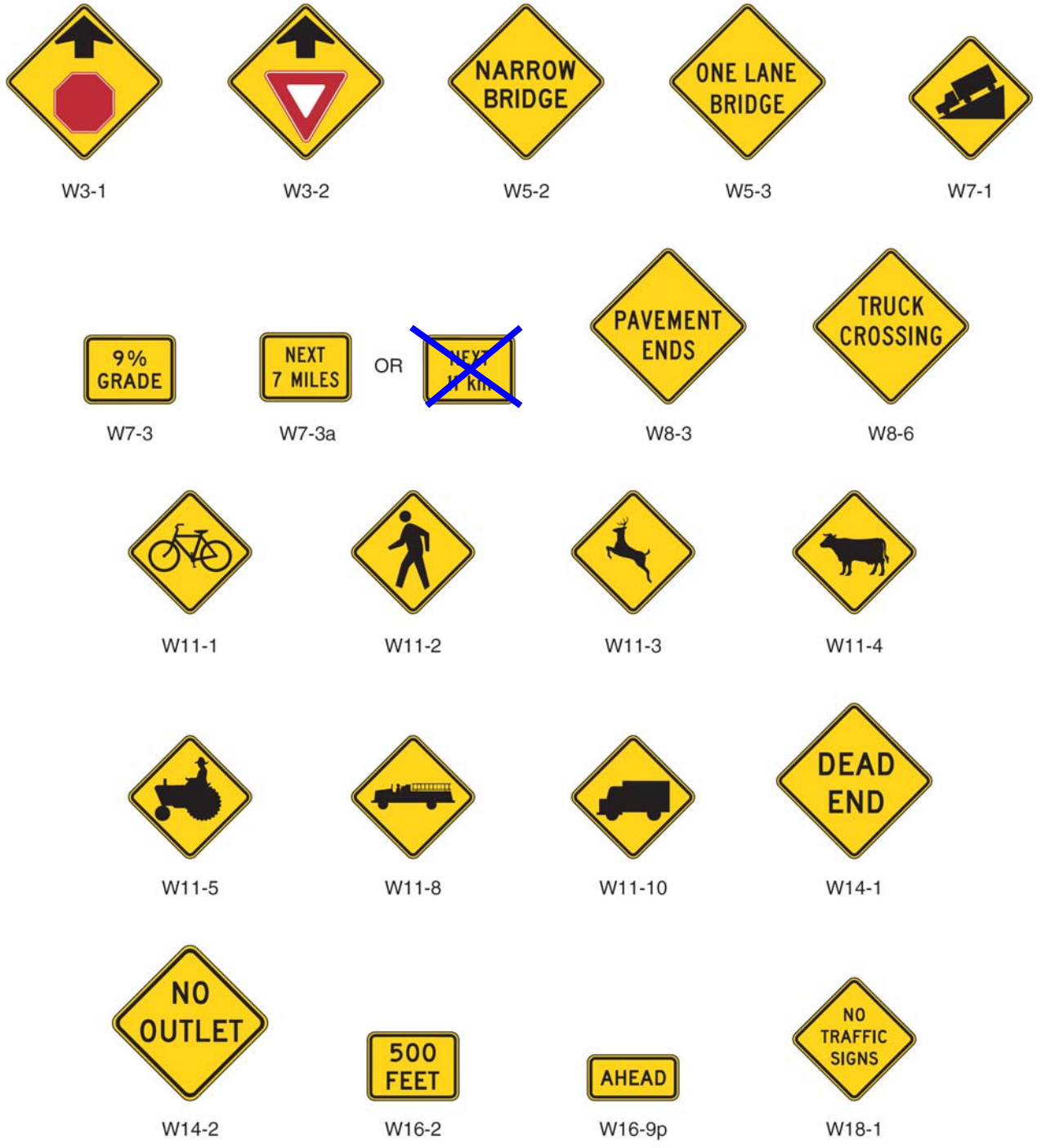
Figure 5C-2. Other Warning Signs on Low-Volume Roads



W3-1 W3-2 W5-2 W5-3 W7-1

W7-3 W7-3a W8-3 W8-6

W11-1 W11-2 W11-3 W11-4

W11-5 W11-8 W11-10 W14-1

W14-2 W16-2 W16-9p W18-1

CHAPTER 5D. GUIDE SIGNS

Section 5D.01 Introduction

Support:

The purpose of a guide sign is to inform road users regarding positions, directions, destinations, and routes.

The criteria for guide signs, in general, are contained in Chapters 2D through 2H and in other Sections of this Manual. Criteria for guide signs that are specific to low-volume roads are contained in this Chapter.

Guidance:

The familiarity of the road users with the road should be considered in determining the need for guide signs on low-volume roads.

Support:

Low-volume roads generally do not require guide signs to the extent that they are needed on higher classes of roads. Because guide signs are typically only beneficial as a navigational aid for road users who are unfamiliar with a low-volume road, guide signs might not be needed on low-volume roads that serve only local traffic.

Guidance:

If used, destination names should be as specific and descriptive as possible. Destinations such as campgrounds, ranger stations, recreational areas, and the like should be clearly indicated so that they are not interpreted to be communities or locations with road user services.

Option:

Guide signs may be used at intersections to provide information for road users returning to a higher class of roads.

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CHAPTER 5E. MARKINGS

Section 5E.01 Introduction

Support:

The purpose of markings on highways is to provide guidance and information for road users regarding roadway conditions and restrictions.

The criteria for markings, delineators, and object markers, in general, are contained in Part 3 and in other Sections of this Manual. Criteria for markings that are specific to low-volume roads are contained in this Chapter.

Section 5E.02 Centerline Markings

Standard:

Where centerline markings are installed, no-passing zone markings in conformance with Section 3B.02 shall also be installed.

Guidance:

Centerline markings should be used on paved low-volume roads where engineering judgment or an engineering study indicates a need for them.

Section 5E.03 Edge Line Markings

Support:

The purpose of edge line markings is to delineate the left or right edge of the roadway.

Guidance:

Edge line markings should be considered for use on paved low-volume roads based on engineering judgment or an engineering study.

Option:

Edge line markings may be placed on highways with or without centerline markings.

Edge line markings may be placed on paved low-volume roads for roadway features such as horizontal curves, narrow bridges, pavement width transitions, curvilinear alignment, and at other locations based on engineering judgment or an engineering study.

If edge line markings are placed without centerline markings, the Two-Way Traffic (W6-3) sign may be used where road users could perceive that they are on a one-way roadway when, in fact, they are on a two lane, two-way highway.

Section 5E.04 Delineators

Support:

The purpose of delineators is to enhance driver safety where it is desirable to call attention to a changed or changing condition such as abrupt roadway narrowing or curvature.

Option:

Delineators may be used on low-volume roads based on engineering judgment, such as for curves, T-intersections, and abrupt changes in the roadway width. In addition, they may be used to mark the location of driveways or other minor roads entering the low-volume road.

Section 5E.05 Object Markers

Support:

The purpose of object markers is to mark obstructions located within or adjacent to the roadway, such as bridge abutments, drainage structures, and other physical objects.

Guidance:

The end of a low-volume road should be marked with an end-of-roadway marker in conformance with Section 3C.04.

Option:

A Type III barricade may be used where engineering studies or judgment indicates a need for a more visible end-of-roadway treatment (see Section 3F.01).

Section 5E.06 Other Markings

Standard:

Other markings, such as stop lines, crosswalks, pavement legends, barricades, channelizing devices, and islands, used on low-volume roads shall conform with the criteria contained in this Manual.

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CHAPTER 5F. TRAFFIC CONTROL FOR HIGHWAY-RAIL GRADE CROSSINGS

Section 5F.01 Introduction

Support:

The criteria for highway-rail grade crossing traffic control devices are contained in Part 8 and in other Sections of this Manual.

Traffic control for highway-rail grade crossings includes all signs, signals, markings, illumination, and other warning devices and their supports along roadways either approaching or at highway-rail grade crossings. The function of this traffic control is to permit reasonably safe and efficient operation of both rail and road traffic at highway-rail grade crossings.

Section 5F.02 Highway-Rail Grade Crossing (Crossbuck) Sign (R15-1, R15-2)

Standard:

The Highway-Rail Grade Crossing (Crossbuck) (R15-1) sign (see Figure 5F-1) shall be used at all highway-rail grade crossings. For all low-volume roads, Crossbucks signs shall be used on the right side of each approach. If there are two or more tracks, the supplemental Number of Tracks (R15-2) sign (see Figure 5F-1) shall display the number of tracks and shall be installed below the Crossbuck sign.

A strip of retroreflective white material not less than 50 mm (2 in) in width shall be used on the back of each blade of each Crossbuck sign for the length of each blade, at all highway-rail grade crossings, except those where Crossbuck signs have been installed back-to-back.

A strip of retroreflective white material, not less than 50 mm (2 in) in width, shall be used on each support at passive highway-rail grade crossings for the full length of the front and back of the support from the Crossbuck sign or Number of Tracks sign to within 0.6 m (2 ft) above the edge of the roadway, except on the side of those supports where a STOP (R1-1) or YIELD (R1-2) sign or flashing lights have been installed or on the back side of supports for Crossbuck signs installed on one-way streets.

Section 5F.03 Highway-Rail Grade Crossing Advance Warning Signs (W10 Series)

~~**Standard:**~~

~~**Except as noted in the Option, a Highway-Rail Grade Crossing Advance Warning (W10-1) sign (see Figure 5F-1) shall be used on all low-volume roads in advance of every highway-rail grade crossing.**~~

~~Option:~~

~~The Highway-Rail Grade Crossing Advance Warning sign may be omitted for highway-rail grade crossings that are flagged by train crews.~~

~~The W10-2, W10-3, and W10-4 signs (see Figure 5F-1) may be used on low-volume roads that run parallel to railroad tracks to warn road users making a turn that they will encounter a highway-rail grade crossing soon after making the turn.~~

Standard:

The Highway-Rail Grade Crossing Advance Warning (W10 Series) signs shall be placed in conformance with Parts 2, 8 and 10 of this Manual.

Section 5F.04 STOP and YIELD Signs (R1-1, R1-2)

Option:

STOP (R1-1) or YIELD (R1-2) signs may be used at low-volume highway-rail grade crossings, at the discretion of the responsible jurisdiction, for crossings without automatic traffic control devices, consistent with the provisions of Sections 2B.04 to 2B.10.

Standard:

A Stop Ahead (W3-1) sign or Yield Ahead (W3-2) sign shall be used in advance of a STOP or YIELD sign at a highway-rail grade crossing if the STOP or YIELD sign is not visible for a distance

that enables the road user to bring the vehicle to a reasonably safe stop at the highway-rail grade crossing.

Section 5F.05 Pavement Markings

~~Guidance:~~

~~Pavement markings at highway-rail grade crossings should be used on paved low-volume roads, particularly if they are already deployed at most other highway-rail grade crossings within the immediate vicinity, or when the roadway has centerline markings.~~

Standard:

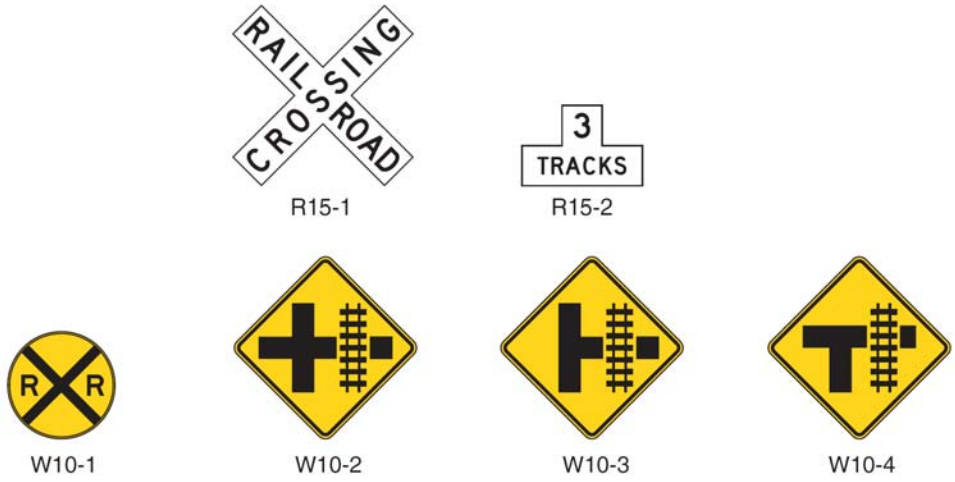
Pavement markings at highway-rail grade crossings shall be placed in conformance with Parts 2, 8 and 10 of this Manual.

Section 5F.06 Other Traffic Control Devices

Standard:

Other traffic control devices that are used at highway-rail grade crossings on low-volume roads, such as other signs, signals, and illumination that are not in this Chapter, shall conform with the criteria contained in Part 8 and other applicable Parts of this Manual.

Figure 5F-1. Highway-Rail Grade Crossing Signs for Low-Volume Roads



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CHAPTER 5G. TEMPORARY TRAFFIC CONTROL ZONES

Section 5G.01 Introduction

Guidance:

The safety of road users, including pedestrians and bicyclists, as well as personnel in work zones, should be an integral and high priority element of every project in the planning, design, maintenance, and construction phases. Part 6 should be reviewed for additional criteria, specific details, and more complex temporary traffic control zone requirements. The following principles should be applied to temporary traffic control zones:

A. Traffic movement should be disrupted as little as possible.
B. Road users should be guided in a clear and positive manner while approaching and within construction, maintenance, and utility work areas.
C. Routine inspection and maintenance of traffic control elements should be performed both day and night.
D. Both the contracting agency and the contractor should assign at least one person on each project to have day-to-day responsibility for assuring that the traffic control elements are operating effectively and any needed operational changes are brought to the attention of their supervisors.

Traffic control in temporary traffic control zones should be designed on the assumption that road users will only reduce their speeds if they clearly perceive a need to do so, and then only in small increments of speed. Temporary traffic control zones should not present a surprise to the road user. Frequent and/or abrupt changes in geometrics and other features should be avoided. Transitions should be well delineated and long enough to accommodate driving conditions at the speeds vehicles are realistically expected to travel.

A Traffic Control Plan (see Section 6C.01) should be used for a temporary traffic control zone on a low-volume road to specify particular traffic control devices and features, or to reference typical drawings such as those contained in Part 6.

Support:

Applications of speed reduction countermeasures and enforcement can be effective in reducing traffic speeds in temporary traffic control zones.

Section 5G.02 Applications

Guidance:

Planned work phasing and sequencing should be the basis for the use of traffic control devices for temporary traffic control zones. Part 6 should be consulted for specific traffic control requirements and examples where construction or maintenance work is planned.

Option:

Maintenance activities may not require extensive temporary traffic control if the traffic volumes and speeds are low. The traffic applications shown in Figures ~~6H-1~~ 6H-1(CA), 6H-11, 6H-15, and 6H-16 of Part 6 are among those that may be used on low-volume roads.

For temporary traffic control zones on low-volume roads that require flaggers, a single flagger may be adequate if the flagger is visible to approaching traffic from all appropriate directions.

Section 5G.03 Channelization Devices

Standard:

Channelization devices for nighttime use shall have the same retroreflective requirements as specified for higher-volume roadways.

Option:

To alert, guide, and direct road users reasonably safely through temporary traffic control zones on low-volume roads, tapers may be used to move a road user out of the traffic lane and around the work space using the spacing of devices that is described in Section 6F.58.

Section 5G.04 Markings

Guidance:

Pavement markings should be considered for temporary traffic control zones on paved low-volume roads, especially roads that had existing pavement markings or that have a surfaced detour or temporary roadway.

Option:

Interim pavement markings in a temporary traffic control zone may not be needed based on the criteria for these markings in Section 6F.72.

Section 5G.05 Other Traffic Control Devices

Standard:

Other traffic control devices, such as other signs, signals, and illumination that are used on low-volume roads in temporary traffic control zones, but are not described in Part 5, shall conform with the criteria contained in other Parts of this Manual.

Support:

Some of the signs that might be applicable in a temporary traffic control zone on a low-volume road are shown in Figure 5G-1.

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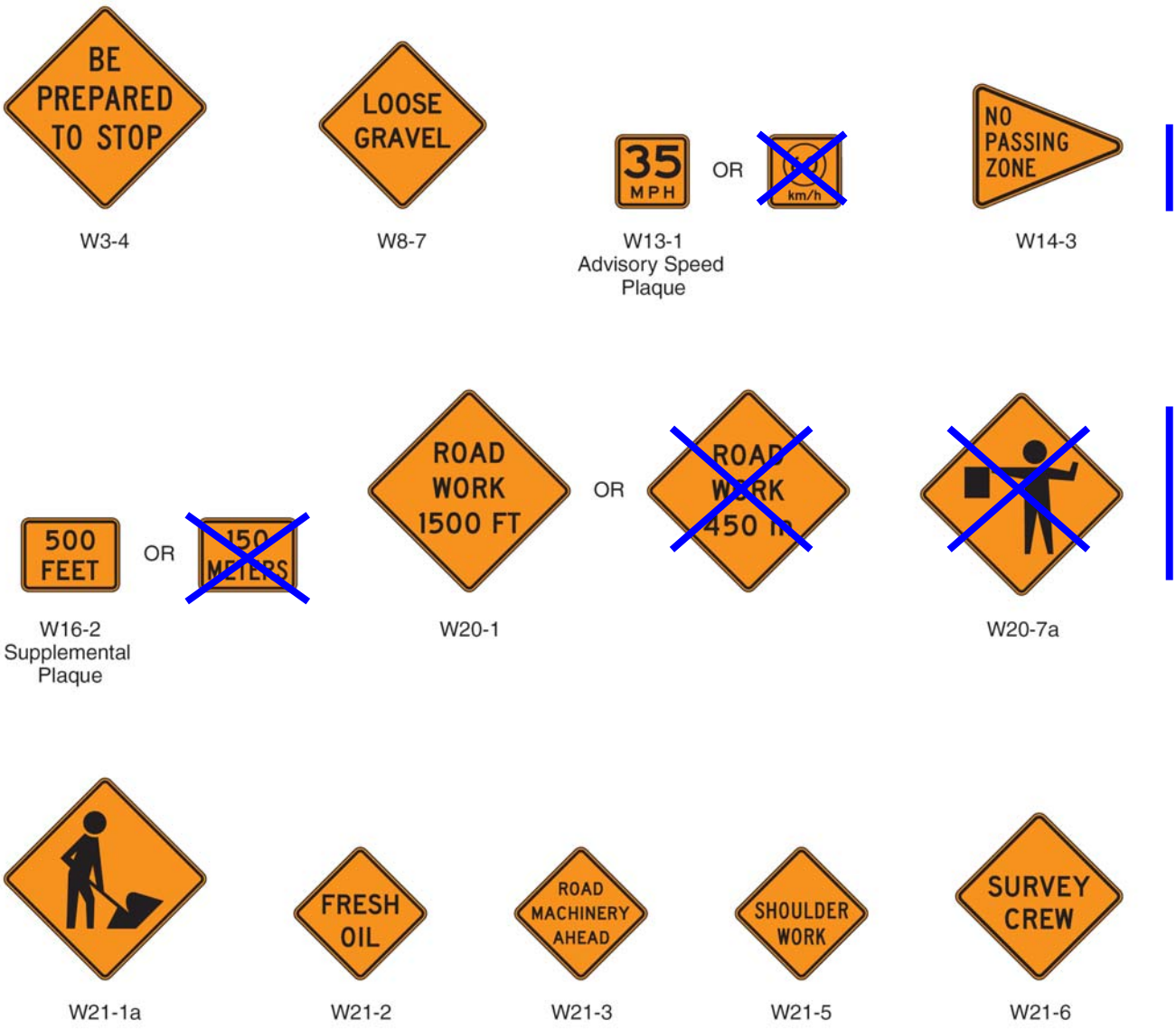
Figure 5G-1. Temporary Traffic Control Signs on Low-Volume Roads



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